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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/895,301	07/02/2001	Hiroyuki Tanaka	OKI.249	2399

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EXAMINER	
FENTY, JESSE A	
ART UNIT	PAPER NUMBER
2815	

DATE MAILED: 11/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/895,301	TANAKA, HIROYUKI	
	Examiner	Art Unit	
	Jesse A. Fenty	2815	

-- The MAILING DATE of this communication app ars on the cover sheet with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 August 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *24-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *24-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 31 and 39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. The limitation, "with its height being gradually decreased" in lines 2 and 3 of the claim is vague and indefinite.

b. Claims 31 and 39 recites the limitation "said electrodes" in line 5 of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 24-30 and 32-38 are rejected under 35 U.S.C. 102(e) as being anticipated by Wu (U.S. Patent No. 6,432,785 B1).

In re claims 24 and 32, Wu (Figs. 4, 8) discloses a semiconductor device, comprising:

A semiconductor substrate (2) having a top surface;

Isolation regions (8) formed in said substrate;

A gate structure (12, 28) formed over said substrate having sidewalls (22) disposed on either side of said gate structure;

A source region having lightly-doped source (LDS) region (30) and a highly-doped source (HDS) region (27), wherein an impurity concentration of said LDS region (column 6, lines 35-37) is lower than an impurity concentration of said HDS region (column 6, lines 32-34), wherein the LDS region is formed below one of said sidewalls, wherein said heavily doped region is disposed between said LDS region and said isolation region, and wherein a portion of said LDS region extends beneath a gate oxide of said gate structure;

A drain region having a lightly-doped drain (LDD) region (30) and a heavily-doped drain (HDD) region (27), wherein an impurity concentration of said LDD region (column 6, lines 35-37) is lower than an impurity concentration of said HDD region (column 6, lines 32-34), wherein the LDD region is formed below one of said sidewalls (22), wherein said HDD region is disposed between said LDD region and said isolation region and wherein a portion of said LDD region extends beneath a gate oxide of said gate structure; and metallic silicide layers (28) respectively formed on said HDS and said HDD regions, said metallic silicide layers being in contact with said sidewalls and said isolation regions, and extending onto said isolation regions, wherein undersides of said metallic silicide layers are substantially coplanar with respective undersides of said sidewalls in contact with said top surface. In that the thermal oxide layer (18) is removed in the sidewall spacer forming process (column 5, lines 18-25).

In re claims 25 and 33, Wu discloses the devices of claims 24 and 32 respectively, wherein said metal silicide layers are formed between each of said sidewalls and said isolation regions.

In re claims 26 and 34, Wu discloses the devices of claims 25 and 33 respectively. The limitations, "wherein said metal silicide layers have undergone ... side walls" is a Product-by-Process limitation that is not given patentable weight because the language does not further limit the structure of the claimed invention.

In re claims 27, 29, 35 and 37, Wu discloses the devices of claims 24 and 32 respectively, wherein impurity concentrations in said LDS and LDD regions are almost the same as those in said HDS and HDD regions. The overlapping ranges of impurity concentrations provided by Wu (column 6, lines 32-34) allow the impurity concentrations of both regions to be set very close together.

In re claims 28, 30, 36 and 38, Wu discloses the devices of claims 24 and 32 respectively, wherein impurity concentrations in said LDS and LDD region is substantially smaller than those in said HDS and HDD regions. The ranges of impurity concentrations provided by Wu (column 6, lines 32-34) allow the impurity concentrations of both regions to be set far apart. For example, the HDS region could be 5E16 and the LDS region could be 5E13.

3. Claims 24-26 and 32-34 are rejected under 35 U.S.C. 102(e) as being anticipated by Sakiyama et al. (U.S. Patent No. 6,352,899 B1).

In re claims 24 and 32, Sakiyama (Fig. 7) discloses a semiconductor device, comprising:

A semiconductor substrate (12) having a top surface;

Isolation regions (16) formed in said substrate;

A gate structure (20) formed over said substrate having sidewalls (22) disposed on either side of said gate structure;

A source region having lightly-doped source (LDS) region and a highly-doped source (HDS) region (26; column 4, lines 23-28), wherein an impurity concentration of said LDS region is lower than an impurity concentration of said HDS region (inherent in the statement that the source and drain are "lightly-doped"), wherein the LDS region is formed below one of said sidewalls, wherein said heavily doped region is disposed between said LDS region and said isolation region, and wherein a portion of said LDS region extends beneath a gate oxide of said gate structure;

A drain region having a lightly-doped drain (LDD) region and a heavily-doped drain (HDD) region (28; column 4, lines 23-28), wherein an impurity concentration of said LDD region is lower than an impurity concentration of said HDD region (inherent in the statement that the source and drain are "lightly-doped"), wherein the LDD region is formed below one of said sidewalls (22), wherein said HDD region is disposed between said LDD region and said isolation region and wherein a portion of said LDD region extends beneath a gate oxide of said gate structure; and metallic silicide layers (36, 38) respectively formed on said HDS and said HDD regions, said metallic silicide layers being in contact with said sidewalls and said isolation regions, and extending onto said isolation regions, wherein undersides of said metallic silicide layers are substantially coplanar with respective undersides of said sidewalls in contact with said top surface.

In re claims 25 and 33, Sakiyama discloses the devices of claims 24 and 32 respectively, wherein said metal silicide layers are formed between each of said sidewalls and said isolation regions.

In re claims 26 and 34, Sakiyama discloses the devices of claims 25 and 33 respectively. The limitations, "wherein said metal silicide layers have undergone ... side walls" is a Product-by-Process limitation that is not given patentable weight because the language does not further limit the structure of the claimed invention.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 31 and 39, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Sakiyama as applied to claim 24 above, and further in view of Hsu et al. (U.S. Patent No. 5,646,435).

In re claims 31 and 39, Sakiyama discloses the devices of claims 24 and 32 respectively, but does not expressly disclose sidewalls brought near to each other, facing each other such that the gate electrode is formed in a manner that both its sides are disposed on said sidewalls. Hsu (Fig. 10) discloses sidewall spacer layers (20) facing each other such that the gate electrode (30) is formed in a manner that both its sides are disposed on the sidewalls. It would have been

obvious for one skilled in the art at the time of the invention to form sidewalls and a gate electrode as disclosed by Hsu for the device of Sakiyama for the purpose, for example, of narrowing the channel length (Hsu; column 1, lines 42-60; column 6, lines 6-9), thereby increasing the packing density of the transistor device.

Response to Arguments

6. Applicant's arguments with respect to claims 17 and 19-23 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Applicant's amendment, the cancellation of previous claims 17 and 19-23 and the addition of new claims 24-39, necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse A. Fenty whose telephone number is 703-308-8137. The examiner can normally be reached on 5/4-9 1st Fri. Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 703-308-1690. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Jesse A. Fenty
Examiner
Art Unit 2815

JAF

Tom Thomas

TOM THOMAS
SUPERVISORY PATENT EXAMINER
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